

BHP Limited: Risk Management Strategy

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BHP Limited, a global natural resource company based in Australia, has traditionally hedged its market price risks with derivatives. Based on the analysis of a 'Cash Flow at Risk' model, which exploits the diversification effect in a portfolio context, it has now decided to discontinue its hedging activities. However, this portfolio approach to risk management raises questions about the standard 'stand-alone' approach to project evaluation and capital allocation.

Readers are invited to send their responses on the case to *Vikalpa* office.

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On December 4, 2000, BHP Limited (BHP) announced it would adopt a 'self insurance' model for commodity and currency price risks as part of a new risk management strategy. According to BHP Chief Financial Officer, Mr Chip Goodyear, "Our new Portfolio Risk Management Policy applies leading financial market analysis to a portfolio of natural resource assets and is focused on supporting BHP's financial objectives while protecting the company's financial security and flexibility. The new risk management policy also constitutes an important component of BHP's portfolio management approach to the allocation of capital and supplements the enhanced discipline for capital deployment adopted during the past 18 months, including processes implemented by the Capital Projects Review Committee."

The BHP Portfolio Risk Management Policy, approved by the BHP Board in November, followed a comprehensive nine-month review of the company's approach to market price risks including commodity price risk, foreign exchange risk, interest rate risk, and freight risk. The analysis showed BHP benefits through the scale, diversity, and flexibility of its asset portfolio with 'natural' hedges reducing the need, and therefore, the cost of hedging market price risks. The 'self insurance' model utilized these natural hedges as the principal means of managing market risk.

The new policy meant BHP would bear the residual market risk, that is, the risk exposure net of the natural hedges provided by diversification. This residual risk would be managed within a quantitative 'Cash flow at Risk' framework measuring projected business Cash flow 'at risk' from adverse movements in foreign exchange rates, commodity prices or other market risks. Hedging transactions would only be undertaken when it was necessary to mitigate risk from underlying exposures in order to support the company's strategic objectives, for example, following a large-scale acquisition. Based on the current composition of BHP's portfolio, there would be no requirement to hedge for the foreseeable future.

Importantly, BHP would now manage market risk at the portfolio level, taking into account the company's natural diversification benefits rather than the previous practice of hedging individual price risks on a transaction or asset basis. BHP would allow its current hedged positions in oil and copper to mature over the remainder of this financial year, and currency hedging positions to mature through to 2004. In addition to risk mitigation, the new policy enabled BHP to capture value by entering into strategic financial transactions when it perceived a significant under or over valuation of a commodity market represented within the company's portfolio. These transactions would only occur infrequently and to a limited extent. They would be treated separately from hedging activities and strictly controlled within defined limits.

Company Background

BHP was incorporated in the state of Victoria, Australia, in 1885 and is a global natural resources company with a regional steel business. With its headquarters in Australia, BHP is Australia's fifth largest public company in terms of market valuation. The company's three principal areas of business are: minerals exploration, production, and processing (principally coal, copper, iron ore, diamonds, silver, lead, zinc); hydrocarbon exploration and production; and steel production.

Minerals

BHP produces iron ore, hot briquetted iron (HBI), metallurgical coal, thermal coal, silver/lead concentrate and zinc concentrate in Australia; copper concentrate, copper cathode, and gold in Chile; copper concentrate and gold in Papua New Guinea and Peru; diamonds in Canada; thermal coal and copper cathode in the US; and thermal coal in Indonesia. The company has interests in iron ore in Brazil, HBI in Venezuela, and a number of prospective, undeveloped minerals reserves throughout the world.

Steel

BHP commenced steelmaking activities in Australia in 1915. It is the sole integrated producer in Australia of basic iron, raw steel and related steel products, supplying approximately 66 per cent of Australia's steel requirements. The company is New Zealand's

only fully integrated steelmaker and supplies the majority of its domestic demand. It has a 50 per cent interest in a flat products steel mini-mill in the US. It also has downstream operations in Asia and the Pacific Region (downstream operations in the US were sold in May 2000). BHP also manufactures sheet steel, pipe and tube, rod and bar, structural rail, and wire products. It is largely self-sufficient in the raw materials necessary for steelmaking.

In February 2000, BHP announced that it intended to effect the divestment of some of its steel businesses by way of a spin-out of a new entity, now known as OneSteel Limited (OneSteel), to its shareholders in the second half of calendar 2000. Following this, BHP planned to focus its core steel businesses around the Port Kembla steelworks and associated flat and coated products stream.

Petroleum

BHP began its involvement in the petroleum industry in 1960 and is now a significant international, upstream exploration and production company. It has a 50 per cent joint venture interest in the Bass Strait fields located off the coast of south-east Australia, which currently supply approximately 38 per cent of Australia's crude oil and condensate production and 23 per cent of its total natural gas production. BHP is also a participant in the North West Shelf Project in Western Australia, which is a significant Australian natural resource project and is a participant in the Laminaria offshore oil project in Northern Australia. The company operates crude oil and gas producing properties in Australia, the US, and the UK and has production interests in Bolivia. In addition, it has numerous other worldwide petroleum exploration and development interests including projects in the Gulf of Mexico and Algeria.

Corporate Services

Corporate services primarily comprise three major business areas:

- **Shared Business Services:** This area manages BHP's internal transaction-based shared services operations (finance and accounting, human resources, supply, etc.).
- **Global Procurement:** This area provides strategic sourcing advice and management.

- **External Sourcing:** This area provides capabilities for managing externally based service supply arrangements; a strategic review capability to evaluate service delivery requirements and design appropriate solutions; an alliance development and outsourcing capability to implement the developed strategies; and an alliance management capability to manage the interface with external suppliers.

Geographical Distribution of Business

Even though BHP was considered an Australian company, only 35 per cent of its revenues came from customers located in Australia. The other major customer locations were the US (17% of revenues) and Japan (13% of revenues). The balance 35 per cent was accounted for by Asia and Europe. The company considered itself a global company selling globally around the world. While Australia was still important to it, the dependence on the Australian market place was expected to decline over time.

Exhibit 1 gives a summary of the financial performance of BHP over the last five years. Exhibit 2 gives the segment-wise distribution of BHP's business activities. Exhibit 3 presents summary information on BHP and other major Australian mining and metal companies.

Corporate Performance and Strategy

The company suffered significant losses during 1997-98 and 1998-99. The losses were attributed to a "steep, cyclical decline in commodity prices, against a background of long-term decline in real commodity prices." This was partly reflected in the decline in operating profit before abnormal items from \$1,361* million in 1996-97 to \$378 million in 1998-99. However, this was accompanied by abnormal losses of \$2,849 million in 1997-98 and \$2,677 million in 1998-99. These abnormal losses were mainly the result of asset write-downs in those years. In response, the company undertook several steps to restore profitability:

- Lowering cost structures.
- Eliminating underperforming, maturing or non-core assets.

*All figures, unless otherwise specified, are in Australian dollars.

- Adopting more innovative ownership structures and risk-sharing strategies.
- Implementing more rigorous approval processes for new projects and capital allocation.
- Simplifying the management structure to foster accountability and communication.
- Linking employee rewards with results for share holders.
- Broadening the management base by attracting outside talent with diverse experiences.

The company also appointed a new Chairman and Managing Director and CEO in 1998. Mr Paul Anderson, Managing Director and CEO, unveiled BHP's new corporate strategy in February 2000. According to him, portfolio management was critical to BHP's long-term success. BHP would actively determine which businesses or commodities the company wished to be in as well as the performance and risk characteristics of the portfolio.

The portfolio management approach would also see BHP move beyond traditional concepts of ownership and from a passive approach to holding assets in the portfolio. Correspondingly, the company would assess, in a disciplined fashion, value-generating opportunities which present themselves at various stages of the commodity cycle, both in terms of acquisition and divestment. Portfolio management would also mean different ownership, joint venture, and financing structures for the company's assets. To support this marked change in the way BHP managed its portfolio, there is a move to a portfolio organizational model with a major shared services component.

Under this model, operational assets report to, and have performance contracts with, the Minerals, Petroleum and Steel Portfolio Leadership Teams. At the corporate level, a small policy committee acts as a portfolio management group, assisted by expert advisory functions. Many of the service delivery and transactional services are being removed from individual assets and provided on a shared services basis. This delivers professional services and lower costs in areas such as finance, payroll, procurement, accounting, and human resources. The new model ensures a global, more value-oriented approach to

managing assets and deploying capital to the best investment opportunities across the company.

The changes in the Minerals organization are an example of the changes under way in BHP. According to Mr Anderson, "To understand why BHP has not extracted the maximum value out of its assets, you need look no further than the Minerals business structure. Minerals has been made up of a series of junior miners. Often they have had their own marketing functions, exploration, research and development, and responsibility for their own commercial arrangements. Our mines have been run, essentially, as stand-alone businesses. Give them a treasury function and investor relations capability and you could float them off. BHP has not had the synergistic benefits of being a major mining company by the way it has been structured. The business structure is reflected in the high level of duplication and built-in redundancy. BHP has over 60 different business computer systems worldwide and 32 different payroll systems in Australia. Until recently, BHP had 30 discovery offices, now reduced to six."

"Furthermore, while I am confident we have excellent people, they have not all been in appropriate positions. BHP has had a process of promoting our best mining operators into roles where they are running complex commercial undertakings. The skills required to run a mining operation are quite different from those needed to run a Minerals business."

As a part of the reorganization process, all the businesses have implemented Portfolio Leadership Teams. These small teams are responsible for managing the portfolio and developing strategy for the businesses. The portfolio leadership model has established three main streams within the Minerals business:

Operational: All assets report to a Chief Operating Officer (COO), allowing assets to concentrate on improving efficiencies and enhancing margins. The COO's role will be to oversee the performance of the mines; benchmark their performance; ensure the appropriate management talent to run the operations and extract the maximum financial performance from the operations. This will include action on global procurement, global maintenance, and the utilization of e-commerce to facilitate procurement as well as improved relationships with customers.

Strategic/Commercial: A Chief Strategic Officer oversees commercial decisions for the Minerals business and assesses growth opportunities. The Chief Strategic Officer will have overall responsibility for strategy, commercial arrangements, marketing, exploration, project development, and for identifying acquisition targets. In each of these areas, he will have a dedicated team of specialists.

Financial: A Chief Financial Officer has responsibility for the financial and administrative performance of the group.

These areas report to the Group President and act as a portfolio leadership team. This team determines key portfolio decisions and has responsibility for delivering the financial benefits of managing BHP Minerals as a global mining house. As part of the reorganization, all senior positions within Minerals have been opened for competitive application. This ensures the appointment of the best and appropriate people in key roles.

This process is expected to result in major business efficiencies, a greater focus and management accountability for the performance of assets, the removal of levels of management, and the stripping out of incompatible systems. This was expected to result in some short-term costs, but over a 2-5 year period, it was expected to create significant value. As summarized by Mr Anderson, "We have centralized back office services, put in place shared business services; we are starting to network our knowledge and we are going about business in a much more collegial, knowledge-sharing way."

Performance Measures

A series of performance measures have been developed associated with these strategic initiatives:

- For operational excellence: decrease operating costs, in real terms, for existing businesses at the rate of at least 2 per cent per annum. This is a continuing 2 per cent decline on an operating base of \$16 billion.
- For portfolio management: generate net operating cash flow in excess of \$11 billion over the next three years to June 2002 as well as \$4 billion from divestments by June 2001.

- Invest approximately \$12 billion for maintenance capital, value added growth projects, exploration and investment expenditures over the period to June 2004. This figure is 33 per cent less than the average annual amount deployed over the last five years. Through this and other strategic initiatives, BHP will generate higher, better quality earnings than has been the case in the past, with much less capital intensity.
- Financial management: An EBITDA to interest coverage ratio of at least 6.0 times at the low point of the business cycle and which exceeds eight times over the cycle. This equates to a gearing band of 40 per cent to 45 per cent.
- Extend debt duration to greater than six years given the 30-40 years duration of assets.
- Reduce reliance of bank funding and credit support to less than 35 per cent by the end of financial year 2003 and utilize project and structured financing where appropriate.

Current Approach to Risk Management

BHP uses risk management tools and techniques in order to manage its exposure to market price volatility. Price risk management programmes are authorized and undertaken from time to time, according to the objectives and strategies of the responsible management and under the BHP market risk policy. This market risk management policy covers price risk inherent in BHP's commodity revenues and costs, and its rates for interest, foreign exchange, and freight. Individual programmes are established to satisfy the objectives of the company's businesses under the overall corporate policy.

Hedges cover only specific commercial transactions. There is no speculative trading. Credit limits are set and monitored for each hedging counterparty. Control procedures separate policy, implementation, confirmation, and accounting. The results of hedging activities are reported daily and monthly to senior management of Minerals and the Price Risk Management Committee, and are subject to internal and external audit. The Board of Directors receives a quarterly price risk report.

The results of the currency and interest rate hedging programmes are reported at the corporate

level. All other commodity programmes are reported at the business group level.

Minerals

Minerals is exposed to significant price risk on sales of copper, gold, silver, lead, and zinc and on purchases of diesel fuel and natural gas.

Hedging is undertaken through transactions entered into in the forward markets of the respective commodities. Forward swap contracts are used for hedging copper, gold, silver, lead, zinc, diesel fuel, and natural gas. Collar option contracts are used for hedging copper, silver, and diesel fuel. Synthetic put option contracts are also used for hedging copper. Forward swap contracts lock in a forward price. Collar options consist of granting a call option and purchasing a put option thereby creating a maximum and minimum price. Synthetic put options are the purchase of a call option against a forward swap, thereby providing for partial participation in price upside.

The responsible level of management establishes hedging strategies and decisions for each commodity. For the major price risks of copper, gold, silver, lead, and zinc, responsibility resides with the corporate Price Risk Management Committee, which includes the CEO, CFO, and the President of each of the company's main businesses. For diesel fuel and natural gas, responsibility resides with operational management.

The maximum proportion of production volume to be hedged is 60 per cent for copper, 80 per cent for gold, and 75 per cent for silver. Maximum hedging limits for other commodities are 100 per cent. There is no minimum level of hedging. Hedge transactions do not exceed 60 months.

Steel

The majority of the iron ore requirements of BHP's steel activities are obtained from mines owned or operated by BHP. BHP Minerals' Illawarra, NSW, Collieries currently supply or have the capacity to supply the bulk of Steel's coking coal requirements. Small quantities of coking coal are purchased from other Australian producers from time to time for blending to optimize quality and operating efficiency. Petroleum coke imported from Indonesia and the US

Table 1: Percentage of Forecast Production Hedged as on June 30, 2000

	<i>July 2000- June 2001</i>	<i>July 2001- June 2002</i>	<i>July 2002- June 2003</i>
Copper			
• Forward Swaps	4.94		
• Put Options	12.22		
Gold			
Forward Swaps	16.01	3.67	
Silver			
• Forward Swaps	20.44		
• Collar Options	3.17	5.31	1.48
Steel			
Purchases (Forward Swaps)			
• Aluminum	51		
• Zinc	58		
• NZS Electricity	34		
Petroleum			
Forward Swaps	22		

has been used as an ash trimming agent in the blend. The majority of the manganese requirements of Steel are obtained from an Australian mine and smelter. The company purchases limestone from Japanese suppliers and Australian mines. Dolomite requirements are met from its own operations in South Australia.

Steel is exposed to price risk on purchases of zinc, aluminium, tin, and electricity. Raw material purchases subject to market price risk total less than \$180 million per annum and electricity purchases subject to market price risk are less than \$45 million per annum. Hedging is undertaken through transactions entered into in the forward markets of the respective commodities. Forward swap contracts are used for hedging each of the commodities. The maximum proportion of estimated future consumption that can be hedged is 68 per cent for raw materials and 82 per cent for electricity. There is no minimum level of hedging. Hedge transactions do not exceed 27 months.

Petroleum

Petroleum is exposed to significant price risk on sales of crude oil and condensate, liquefied natural gas (LNG), natural gas, and liquefied petroleum gas (LPG). Hedging is undertaken through transactions entered into in forward markets, including both exchange traded and over-the-counter markets. Hedging is undertaken using forward swap and options contracts.

The maximum proportion of production volume to be hedged is recommended by the President of the Petroleum division. The current recommended maximum is 75 per cent of projected production. There is no minimum level of hedging. Hedge transactions do not typically exceed 36 months. Table 1 gives the extent of hedging as on June 30, 2000.

Currency Hedging

BHP is exposed to exchange rate transaction risk on foreign currency sales and purchases. In the financial period ended 30 June 2000, approximately 67 per cent of the company's sales revenue was denominated in, or was linked to, the US dollar. However, the majority of BHP's operating costs were denominated in Australian dollar. The most significant exchange risk is the anticipated US dollar receipts of Australian-based entities.

Hedging is undertaken through transactions entered into in foreign exchange markets. The company uses forward exchange contracts and currency option contracts for hedging. Under policies set down by the Board of Directors, anticipated US dollar exposures of Australian-based entities may be hedged for up to five years. The BHP Group's policy is to hedge up to a maximum limit of 70 per cent of the rolling forecast US dollar exposures of Australian-based entities in the first and second years, and a maximum of 50 per cent in years three to five. There is no minimum limit. These policies can be varied only by the Board of Directors. Maturity profiles of foreign exchange hedges are approximately the same as those of the anticipated transactions being hedged. Other foreign currency denominated revenues and purchases are generally not hedged, unless material. Hedge transactions do not exceed 60 months.

BHP is exposed to exchange rate translation risk in relation to foreign currency denominated debt. The company manages its foreign currency translation exposures so that foreign currency net assets provide a natural hedge against the effect of variations in the exchange rate on the Australian dollar value of foreign currency denominated debt. Where natural hedges are deficient, specific hedging is undertaken through transactions entered into in foreign exchange and interest rate markets. The company uses cross-currency swaps for hedging.

Interest Rate Risk

BHP is exposed to interest rate risk on its debt portfolio. Hedging is undertaken through transactions entered into in foreign exchange and interest rate markets. The company uses interest rate swap and cross-currency swap contracts for hedging. The maximum level of floating rate debt that can be held is 65 per cent with a minimum level of 35 per cent.

Risks of Financial Instruments

The financial instruments used for hedging were subject to liquidity risks, basis risk, and credit risk. Liquidity risk for derivatives arises from the possibility that a market for derivatives may not exist in some circumstances. As a general principle, basis risk is minimized. For liquidity considerations, hedging activities are frequently undertaken in the most liquid markets and then, if necessary, swapped into the correct basis.

Credit risk for derivatives represents the risk of counterparties defaulting on their contractual derivative obligations and is managed by the application of credit approvals, limits, and monitoring procedures. Counterparties to derivatives consist of a large number of prime financial institutions. The BHP Group has no significant concentration of credit risk with any single counterparty or group of counterparties. It generally does not require collateral in relation to the settlement of financial instruments.

Risk Management by Other Firms in the Industry

Not all firms in the industry managed risk in this manner. A notable exception was the Anglo-Australian company Rio Tinto which followed a policy of not hedging any of its risks. Details of Rio Tinto's strategy are given in Exhibit 4.

New Risk Management Strategy

BHP announced its new risk management strategy in December 2000. Given below are the broad features of this strategy.

Historically, BHP has undertaken hedging of its main commodity exposures (oil, copper) while also having a major currency hedging programme in

place. The market risk review was dictated by a desire to determine the necessity and efficacy of hedging activities in the context of total portfolio risk, rather than a business unit-based perspective of risks to cash flows or budgetary outcomes.

Even before the announcement of the new strategy, the hedging activities from the business units were moved into a centralized Price Risk Management Committee. However, the real review of the hedging strategy took place following the announcement of BHP's overall strategy in February. As pointed out by Mr Goodyear, "You can't really set a hedging strategy until you understand what the corporate-wide strategy is."

The strategic review of BHP's market risk was undertaken as part of the establishment of clear, disciplined, and rigorously-based portfolio risk management tools, to support the implementation of its portfolio management model. The work complemented and built upon the establishment of capital disciplines for the approval of capital projects and major transactions as well as ongoing work on country risk management.

A new group, called Market Risk Management (MRM), headed by Mr Rowen Bainbridge, managed the process of reviewing the hedging strategy. Mr Bainbridge joined BHP from Fletcher Challenge Energy, where he was engaged in risk management. Prior to that, he had been in petroleum trading operations in London and was also involved in sales and marketing activities in the resource-type industry. In addition, there was an internal peer review in order to challenge and test the assumptions and the conclusions of the MRM Group. The Group consulted with outside experts, both in academia and industry, BHP investors, rating agencies, and financial institutions. The Policy Committee reviewed the work on almost a monthly basis since February, and the Board conducted three separate reviews.

Research and Analysis

The review involved research and analysis including:

- Detailed quantitative modelling of BHP's existing and potential portfolio of risk exposures, including extensive scenario analysis and stress-testing, using a three-year 'Cash flow at Risk' (CFaR) model based on the corporate business plan.

- Analysis of the dynamics of key financial and commodities markets for BHP.
- Review of the effectiveness of the historic approach to hedging activities.
- Extensive benchmarking of peer group practices and case studies from other industries.
- Independent analysis of BHP shareholder profiles as basis for assessing their risk preferences.

In order to investigate details of BHP's exposure to market risk, a three-year CFaR model has been developed. The CFaR technique is an adaptation of the Value at Risk (VaR) technique typically found in financial institutions. CFaR is defined as the "worst expected loss relative to projected business plan Cash flows over a one year horizon under normal market conditions at a confidence level of 95 per cent." Cash flow is measured as earnings after interest but before taxes, depreciation, and amortization. BHP has modelled market risk in many ways. The numbers below are based on forecast production volumes, forward curves (where available), and historical volatilities and correlations. There is significant agreement between the model results and BHP's past performance. Details of the CFaR model as presented to analysts are given in Exhibit 5.

The key point emerging from the model is that natural diversification in BHP's portfolio effectively halves the CFaR compared to a hypothetical 'undiversified' company with the same revenues and subject to similar market volatility. Based on BHP's current business plan, the company would have a CFaR of \$3.1 billion without any diversification benefits, while the effects of diversification reduce that number to \$1.6 billion. The current hedge portfolio further reduces this to \$1.4 billion. The ratio of CFaR to cash flow is approximately 23 per cent.

The research and analysis led to the following conclusions:

- BHP has a significant degree of risk mitigation through the natural diversification of its portfolio.
- The residual market risk in BHP's portfolio, when added to other risk categories (country, operational, etc), does not represent a significant exposure to the overall corporate strategy. This

has been tested by linking the CFaR model to BHP's business planning model to obtain Cash flow, profit and loss, and balance sheet information under various simulations.

- The analysis reveals that, even with no hedging, the probability of violating the leverage requirement for a A rating is less than-1 per cent over a one-year period. Over a five-year period, the probability increases to 15 per cent. However, with suitable management action in response to the adverse shocks, the probability can be reduced to less than 1 per cent. The possible management 'levers' include discretionary CAPEX, planned acquisitions and explorations that can be deferred, dividend policy, and running down of cash reserves.
- There is no clear evidence that reducing Cash flow volatility benefits shareholders or is an attribute sought in determining investment choice for resources companies. Share price reflects corporate strategy. Value is ascribed to risk management only in so far as it supports the corporate strategy, is clearly communicated, and consistently applied.
- Given BHP's exposure profile, a continuation of hedging would likely incur substantial costs and, considering the absence of a clear benefit to shareholders, would be more likely to negatively impact shareholder value in the long run than to enhance it. For example, the two major markets for BHP, copper and oil, tend to backwardation, i.e., spot prices on average work out to be higher than forward prices. This represents a cost of selling forward.

Risk Management Strategy

Based on the analysis, the Board approved a new market risk management strategy - Portfolio Risk Management. The new market risk strategy supports BHP's portfolio business model, is based on extensive quantitative analysis of the risks and opportunities in the BHP portfolio, and applies leading financial markets analysis to a portfolio of natural resource assets. The objective of the new strategy is to support the delivery of BHP's financial targets while protecting the company's future financial security and flexibility. "It is not necessarily what your earnings are next year, it is: Do you have the

cash to put into those opportunities that, at the end of whatever time period you are looking at, add value?"

The strategy entails managing risk at the portfolio level through the adoption of a 'self insurance' model. This means using the 'natural hedges' provided through the scale, diversity, and flexibility of the portfolio as the principal means for managing risk. Further, BHP will bear the residual market risk (that risk net of the natural diversification) rather than engage in hedging of this risk. Hedging programmes will be effectively discontinued and existing hedge positions allowed to 'run off.' Market risk will be managed within a quantitative CFaR framework.

The strategy does not imply that BHP will never hedge its market risk. There may be circumstances, such as following a major acquisition or price shock, when it becomes appropriate to mitigate risk in order to support the company's broader strategic objectives. In such circumstances, BHP may execute hedge transactions. Based on the CFaR analysis of the corporate business plan, this will not be a requirement for the foreseeable future.

BHP may infrequently and to a limited extent enter into strategic financial transactions when there is perceived to be a significant under or overvaluation of a commodity market represented within its portfolio. Such transactions would be treated separately from any hedging transactions. They would be strictly controlled under a separate Stop-Loss and VaR limit framework.

As summarized by Mr Goodyear, "The strategy is all about being consistent and helping to deliver on BHP's overall corporate strategy and financial targets. The strategy works for BHP because of its low-cost base. Don't interpret this strategy as the right strategy for other diversified resource companies because they don't have the strength of cash flow or the breadth of funding that BHP has. The tool that we've developed here becomes a building block for decision making, much further than market risk management, in terms of thinking about how different investments affect the overall portfolio and being able to run scenarios on that. It is another way to look at our business in the broad strategies of allocating capital, acquiring businesses, divesting businesses, and other strategic decisions. What is important is not just the rate of return on a project and the net present value of a project. We would

certainly look at those things. But we also need to understand how it impacts on our portfolio and how it changes the risk."

Communication of Portfolio Risk Management Strategy

The strategy emphasizes a commitment to communicating to stakeholders in a clear, precise, and responsive manner. BHP will communicate the execution of its new policy by a number of means as follows:

- The Market Risk Management Policy will be detailed in the *Annual Report* - including sections on policy and governance.
- There will be quarterly disclosure of exposures and related hedge transactions.
- There will be annual disclosure of CFaR.
- Profit and loss on strategic financial positions will be reported in quarterly profit announcements.
- VaR on any strategic financial positions will be disclosed.

In its disclosures, the company will strike a balance between being clear, responsive, and open without leaving itself at a competitive disadvantage. For this reason, the actual CFaR limits and the rationale behind each of the transactions will not be disclosed. "We don't want our competitors to understand the risk to which we're happy to run the portfolio."

Governance Framework

Given the implications of this strategy, governance is an important feature of implementation. The key features of the framework are outlined below:

- Policy is approved by the Board.
- The Policy Committee is responsible for implementation of BHP's Market Risk Management Policy.
- There will be regular reporting to the Board including status information (e.g., portfolio com-

position, hedge position, mark-to-market, CFaR, VaR), compliance information, and performance information.

- Policy will be disclosed at least annually in BHP's annual financial statements, and more often if material changes are made to policy.

Analysts' Questions

Mr Chip Goodyear and Mr Rowen Bainbridge made a presentation of the new risk management strategy at an analysts' briefing on Monday, 4 December 2000. Following the presentation, there were several questions about the new approach to risk management.

- We all know that the co-variance between the various parameters which influence BHP's financial results change over time. For example, historically, people have said that when commodity prices like oil and copper are high, the Australian dollar is high. At the moment it is low. To what extent does this model compensate for such changes in the relationship between the underlying parameters?
- When you talk about currency of cash flow or currency of the capacity to invest in offshore assets, is BHP now a composite currency company? Or is it Australian dollars or US dollars when we talk about cash flow?
- If you were a US dollar reporting company, would your decisions about hedging have changed? How much diversification benefit is coming through the Australian dollar?

For limited strategic transactions, your limits would be 25 million value at risk. Why bother given the management time and management focus it is probably going to take to do?

You talked about most of the assets you have got being in backwardation. This is also the case of the Australian dollar with forward prices higher. Does the model and the simulation take into account changes in the forward curve? If Australian dollar, for some reason, went back into premium, would that have an impact on the results of the model?

This question is probably an extension of a couple of the earlier ones. When you are evaluating a project, you look at the geographical risk, the pricing risk, the technical risks, different tax jurisdictions and come up with a better rate of cost of cover for the individual project. You are now taking that to the next stage and looking at the marginal contribution of that investment to portfolio risk. Depending on the nature of the project, that could actually be a marginal increase or decrease in portfolio risk. How do you incorporate that marginal contribution to overall portfolio risk in your decision making for that specific project? You can get to the ridiculous situation where you are investing in something you do not really like because it reduces marginal portfolio risk. I am just trying to get a sense of where your thinking is in terms of the trade-off between the inherent stand alone robustness of an investment project and its impact on the marginal risk of the overall portfolio.

Exhibit 1: Financial Summary 1996-2000

This financial summary includes selected information restated on a 12 months to June basis, which has not been subject to audit review. The purpose of making such restated data available is to provide information which is comparable in all material respects with similar entities having a 30 June year end. All data presented have been prepared in accordance with Australian generally accepted accounting principles and accounting policies applying to each period, except for years ended 30 June 1996 and 1997 which have been restated to reflect adoption of AASB 1033: Presentation and Disclosure of Financial Instruments. Adoption of this standard resulted in certain redeemable preference shares which exhibited the characteristics of liabilities being reclassified from outside equity interest to borrowings.

Balance Sheet Items	Years Ended 30 June				
	2000 \$m	1999 \$m	1998 \$m	1997 \$m	1996 \$m
Current Assets	6 081	6 017	7 415	7 889	6 279
Non-current Investments	1 131	893	853	770	2 304
Property, Plant, and Equipment	19 586	22 404	26 413	26 061	24 177
Intangibles	130	175	387	389	393
Other Non-current Assets	2 416	2 311	2 610	1 659	2 083
Total Assets	29 344	31 800	37 678	36 768	35 236
Deduct					
Current Liabilities	6 823	6 089	5 895	6 889	6 087
Non-current Borrowings	5 868	10 060	13 452	11 126	11 404
Other Non-current Liabilities	5 648	5 866	5 634	4 981	4 419
Net Assets	11 005	9 785	12 697	13 772	13 326
Shareholders' Equity					
- Attributable to Members of the BHP Entity	10 353	9 090	11 860	12 952	12 639
- Attributable to Outside Equity Interests	652	695	837	820	687
Total Shareholders' Equity	11 005	9 785	12 697	13 772	13 326
Balance Sheet Statistics					
Total Borrowings(a) as a Percentage of Total Borrowings and Shareholders' Equity	42.7%	53.7%	53.2%	48.8%	43.5%
Return on Shareholders' Equity					
- At Year End (Excluding Abnormals)	19.2%	4.2%	10.6%	10.5%	10.2%
- At Year End (Including Abnormals)	15.3%	(25.3)%	(13.4)%	3.5%	7.7%
Return on Capital(b)					
- Excluding Abnormal Items	12.0%	3.3%	6.3%	7.0%	6.7%
- Including Abnormal Items	10.0%	(7.5)%	(4.0)%	3.7%	5.4%

(a) Total borrowings (current and non-current), excluding finance leases, bank overdrafts, and other.

(b) Calculated as operating profitX(loss) after income tax attributable to members of the BHP entity, as a percentage of average capital employed, where average capital employed equals total shareholders' equity plus current and non-current borrowings (long-term loans, redeemable preference shares, and non-recourse finance).

Contd.

	<i>Years Ended 30 June</i>				
	<i>2000</i>	<i>1999</i>	<i>1998</i>	<i>1997</i>	<i>1996</i>
Profit and Loss Statement Items	\$m	\$m	\$m	\$m	\$m
Sales to Australian Customers					
- From Australia	6 397	5 920	6 738	6 820	6 312
- From Outside Australia	104	88	44	95	192
Sales to Non-Australian Customers					
- From Australia	6 092	6 395	6 844	5 957	5 798
- From Outside Australia	7 279	6 884	7 659	7 957	6 938
Total Sales	19 872	19 287	21 285	20 829	19 240
Other Revenue	2 081	2 732	1 907	2 961	701
Operating Revenue	21 953	22 019	23 192	23 790	19 941
Depreciation and Amortization	2 140	2 203	2 218	1 979	1 813
Borrowing Costs	664	718	752	784	600
Income Tax Expense Before Abnormal Items	901	550	844	926	900
Operating Profit After Income Tax Before Outside Equity Interests and Abnormal	1954	375	1 228	1 413	1385
Outside Equity Interests Share of					
Operating Profit/(Loss)	32	3	30	(52)	(102)
Operating Profit Before Abnormal Items	1 986	378	1 258	1 361	1 283
Deduct Abnormal Items After Income Tax	(405)	(2 677)	(2 849)	(903)	(312)
Operating Profit/(Loss) Attributable to Members of the BHP Entity	1 581	(2 299)	(1 591)	458	971
Profit and Loss Statement Statistics					
Basic Earnings per Share(a)					
- Excluding Abnormal Items	\$1.122	\$0.218	\$0.742	\$0.829	\$0.798
- Including Abnormal Items	\$0.893	\$(1.325)	\$(0.938)	\$0.279	\$0.604
Dividends or Equivalent as Declared(\$ Million)	903	884	866	836	819
Per Fully Paid Share	\$0.510	\$0.510	\$0.510	\$0.510	\$0.510
EBIT Interest Cover (Times)(c)					
- Excluding Abnormal Items	5.2	1.8	2.9	3.3	3.7
- Including Abnormal Items	3.3	(b)	(b)	2.3	3.1
EBITDA Interest Cover (Times)(d)					
- Excluding Abnormal Items	8.3	4.2	5.2	5.4	6.0
- Including Abnormal Items	6.5	0.9	1.9	4.4	5.5
(a) Based on operating profit/(loss) after tax attributable to members of the BHP entity divided by the average number of fully paid shares.					
(b) Figure is negative.					
(c) Calculated as profitX(loss) before borrowing costs incomeXtax expense divided by total borrowing costs.					
(d) Calculated as profit/(loss) before borrowing costs, income tax, depreciation, and amortization expense, divided by total borrowing costs.					

Contd.

Statement of Cash Flows for the Financial Period Ended (a)

	<i>30 June 2000</i> <i>\$m</i>	<i>31 May 1999</i> <i>\$m</i>	<i>31 May 1998</i> <i>\$m</i>
Cash Flows Related to Operating Activities			
Receipts from Customers	20 959	19 331	21 466
Payments to Suppliers, Employees, etc.	(16 210)	(15 248)	(16 654)
Dividends Received	46	20	40
Interest Received	91	221	147
Borrowing Costs	(916)	(1 087)	(1 058)
Proceeds from Gas Sales Contract Price Renegotiation	231	708	
Other	337	348	136
Operating Cash Flows Before Income Tax	4 538	4 293	4 077
Income Taxes Paid	(600)	(708)	(518)
Net Operating Cash Flows	3 938	3 585	3 559
Cash Flows Related to Investing Activities			
Purchases of Property, Plant and Equipment	(1 102)	(2 608)	(3 782)
Exploration Expenditure	(373)	(643)	(712)
Purchases of Investments	(438)	(137)	(136)
Purchases of, or Increased Investment in Controlled Entities Net of their Cash		(75)	(19)
Investing Outflows	(1 913)	(3 463)	(4 649)
Proceeds from Sale of Property, Plant and Equipment	741	548	408
Proceeds from Sale or Redemption of Investments	242	361	1 938
Proceeds from Sale or Partial Sale of Controlled Entities and Joint Venture Interests Net of their Cash	698	1 290	780
Net Investing Cash Flows	(232)	(1 264)	(1 523)
Cash Flows Related to Financing Activities			
Proceeds from Ordinary Share Issues, etc.	275	149	355
Proceeds from Sale of Employee Share Plan Loans			110
Proceeds from Issue or Renegotiation of Preference Shares			646
Borrowings	1 658	2 018	2 548
Repayment of Borrowings	(4 867)	(4 310)	(4 317)
Redemption of Preferences Shares			(632)
Dividends Paid	(498)	(520)	(449)
Net Financing of Controlled Entities			
Other	82	(14)	224
Net Financing Cash Flows	(3 350)	(2 677)	(1 515)
Net Increase/ (Decrease) in Cash and Cash Equivalents	356	(356)	521
Cash and Cash Equivalents at Beginning of Period	573	949	363
And Cash Equivalents	8	(20)	65
Cash and Cash Equivalents at End of Period	937	573	949

(a) June 30, 2000 refers to the thirteen months ended 30 June 2000. May 31 refers to the year ended 31 May.

Exhibit 2: Segment-wise Reports

	<i>Operating External</i>	<i>Profit After Revenue Tax, Before Inter- Abnormal segment Items(a)</i>		<i>Abnormal Items Net of Tax</i>	<i>Profit After Tax and Abnormal Items (a)</i>	<i>Segment Gross</i>	<i>Assets Net</i>	<i>Capital Expendi- ture (b)</i>
Industry Classification c								
2000 \$m								
Minerals	8 860	356	1 224	(744)	480	11 917	8 291	362
Steel(d)	8 569	27	410	(159)	251	7 673	5 850	150
Petroleum	5 625	14	1 155	171	1 326	7 401	3 515	488
Services	824	1 271	73	42	115	553	57	18
Net Unallocated Interest	65		(512)	(3)	(515)			
Group and Unallocated Items(e)	(260)	7	(352)	288	(64)	1 800	(6 708)	31
BHP Group	23 683	1 675	1 998	(405)	1 593	29 344	11 005	1 049
1999 \$m								
Minerals	9 730	498	678	(2 649)	(1 971)	13 187	8 845	1 316
Steel(d)	8 158	26	268	(105)	163	8 673	6 623	352
Petroleum	3 203	10	321	(89)	232	7 826	4 261	760
Services	1 267	1 500	97	173	270	756	93	23
Net Unallocated Interest	111		(449)		(449)			
Group and Unallocated Items (e)	(548)	3	(547)	(7)	(554)	1 045	(10 461)	9
BHP Group	21 921	2 037	368	(2 677)	(2 309)	31 487	9 361	2 460
1998 \$m								
Minerals	8 600	575	678	(2 483)	(1 805)	16 119	12 339	2 545
Steel(d)	8 435	36	524	(246)	278	9 820	7 562	435
Petroleum	5 175	15	749	(163)	586	8 354	5 250	835
Services	2 530	1 599	153	99	252	1 037	266	33
Net Unallocated Interest	127		(493)		(493)			
Group and Unallocated Items(e)	(203)	10	(349)		(349)	1 752	(13 008)	21
BHP Group	24 664	2 235	1 262	(2 793)	(1 531)	37 082	12 409	3 869

(a) Operating profit after income tax is before deducting outside equity interests.

(b) Excluding capitalized borrowing costs and capitalized exploration.

(c) Comparative figures have been restated to reflect the transfer of internal currency hedging results from Minerals, Steel, and Petroleum to Group and unallocated items where they now eliminate.

(d) Includes the One Steel business, to be spun-out in the second half of calendar 2000.

(e) Includes consolidation adjustments.

Exhibit 3: Selected Australian Mining and Metals Companies

<i>Company</i>	<i>Long-term Rating/Outlook*</i>	<i>Core Commodities</i>	<i>Total Debt (Million A\$)</i>	<i>Total Assets (Million A\$)</i>	<i>Sales (Million A\$)</i>	<i>Operating Income</i>	<i>Operating Income/Sales (<*>)</i>	<i>ROPC</i>	<i>EBITDA Interest Cover (x)</i>
Broken Hill Proprietary Co. Ltd.(The)(1)	A-/Stable/A-2	Diversified	8,398	29,344	21,506.0	4,633.0	23.8	11.5	5.3
Rio Tinto Ltd. (2)	AA-Negative/A-1+	Diversified	3,218	15,609	7,197.0	2,997.0	41.6	19.0	10.9
WMC Ltd.	A/Negative/A-1	Diversified	2,613	8,916	2,094.8	707.0	35.0	5.2	3.4
MIM Holdings Ltd.	BBB /Stable/A-3	Copper, Lead, Zinc	2,329	6,840	3,346.5	819.4	25.0	7.2	4.1
Normandy Mining Ltd.	BBBVNegative/-	Gold	1,552	3,626	1,323.6	(143.5)	(10.4)	(10.0)	N.M.
Pasminco Ltd.	BBB-/Negative/A-3	Lead, Zinc	1,411	3,890	1,878.3	305.8	18.7	3.9	3.1
Anaconda Nickel Ltd.(3)	Not Rated	Nickel	800	1,330	0.0	25.3	N.A.	(0.2)	0.3
North Ltd.(3)	AVWatch Pos/A-2	Iron Ore	618	3,674	1,704.7	565.4	47.6	23.6	19.9
Newcrest Mining Ltd.	Not Rated	Gold	500	1,132	697.5	161.4	23.4	2.6	5.1
Alcoa of Australia Ltd.	A+/Negative/A-1	Ahimina, Aluminium	434	3,521	2,670.1	906.2	34.6	28.3	30.4
QCT Resources Ltd.	BBB/Watch Pos/A-2	Coal	413	1,348	770.0	69.2	14.1	(1.5)	2.7
Centaur Mining & Exploration Ltd. (3)	B-/Negative/-	Gold, Nickel	378	586	165.1	7.4	4.5	1.5	0.6

*Local currency ratings at October 17, 2000.

Note: All ratios calculated using latest 12-month fiscal results except for:

- (1) Which has a 13-month fiscal year in 2000.
- (2) Denominated in US dollars.
- (3) Preliminary results non-operating lease.

Source: "Standard and Poors" (2000). *Australian Mining & Metals Review*, November.

Exhibit 4: Rio Tinto Risk Management Policy (1999 Annual Report)

Rio Tinto is already more diversified, both by product and by geography, than any of its competitors. We believe this has been of great benefit but we do not seek further diversity for its own sake. Our future investment flows will be determined by our ability to create value and not in pursuit of a theoretical 'ideal' mix of commodities.

Currency Risk

In the case of the Australian dollar, there is a significant degree of natural protection against cyclical fluctuations, in that the currency tends to be weak (reducing costs in US dollar terms) when commodity prices are low. Given the dominant role of the US currency in the Group's affairs, the US dollar is the currency in which financial performance is measured and in which financial results are presented both internally and externally. It is also the natural currency for borrowing and holding surplus cash. The Group does not generally believe that active currency hedging would provide long-term benefits to shareholders.

Interest Rates

Rio Tinto's interest rate management policy is to borrow and invest cash at floating rates. Short-term US dollar rates

are normally lower than long-term rates resulting in lower interest costs to the Group. Furthermore, cyclical movements of interest rates tend to compensate, to an extent, for those of commodity prices.

Commodity Prices

Rio Tinto's business is mining and not commodity trading. Its normal policy is to sell its products at prevailing market prices. Rio Tinto's exposure to commodity prices is diversified by virtue of its broad commodity spread and the Group does not generally believe commodity price hedging would provide long-term benefit to shareholders.

General

Rio Tinto does not acquire or issue derivative financial instruments for trading or speculative purposes. Such instruments are used to separate funding and cash management decisions from currency exposure and interest rate management. The Group has used interest rate swaps in conjunction with longer-term funds raised in the capital markets to achieve a floating rate obligation which is consistent with the Group's interest rate policy. Currency swaps have been used to convert debt or investments into currencies, primarily the US dollar, which are consistent with the Group's policy on currency exposure management.

Exhibit 5: Risk Management Presentation to Analysts on December 4, 2000

Cash Flow at Risk

First, I want to get a common understanding of what we mean by risk. Here is a simplified example. Imagine I have an oil company that produces 10 million barrels next year and I expect the price to be about \$30 per barrel. I can expect to get 300 million dollars of cash flow from my oil business. But I know that oil prices go up and down so there is a degree of uncertainty in that 300 million dollar number*. I expect prices to be \$30, but I know that they can rise as high as maybe \$35 or possibly as low as \$25. I could describe the likelihood of those prices through a probability distribution that describes a range of outcomes.

If I take that price distribution and multiply it by the volume of product that I expect to produce, I can turn those into cash flow numbers. Suppose I expect my oil business to produce 300 million dollars next year, but there is a chance that I might only produce 250 or may produce as much as 350. If I select a level of confidence, say 95 per cent or a one chance in 20, and let us say it was 250 million dollars. I can then look at the distance between those two and say I have 50 million dollars of

cash flow at risk with a one in 20 level of confidence. That cash flow at risk is one measure to describe the risk of a business.

That is a simplified example of a single-asset business. What does BHP look like from a risk perspective?

Asset Risk and Portfolio Risk

If I take the simple example that I talked about earlier, I could say it had 300 million dollars of cash flow as a return measure and 50 million dollars of cash flow at risk. We have performed that analysis for all individual businesses for BHP. If I add up the individual returns in my business, we get the expected cash flow for BHP next year. In our model, cash flow is EBITDA. Let us say that happened to be about five billion dollars in the particular example.

Similarly, if I add up all the individual risks, I get the BHP total risk number, which is about 3.1 billion dollars.

But that would be overestimating the amount of risk in BHP. If we had assets that were all the same, such that they were all oil-producing assets and they all had

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correlations of one, then we could add up those risks and indeed-we would have 3.1 billion dollars cash at risk. What that means is, if we expect to return five billion dollars of cash flow next year, there is a one in 20 chance that it would be less by 3.1 billion dollars or you actually only receive 1.9 billion dollars.

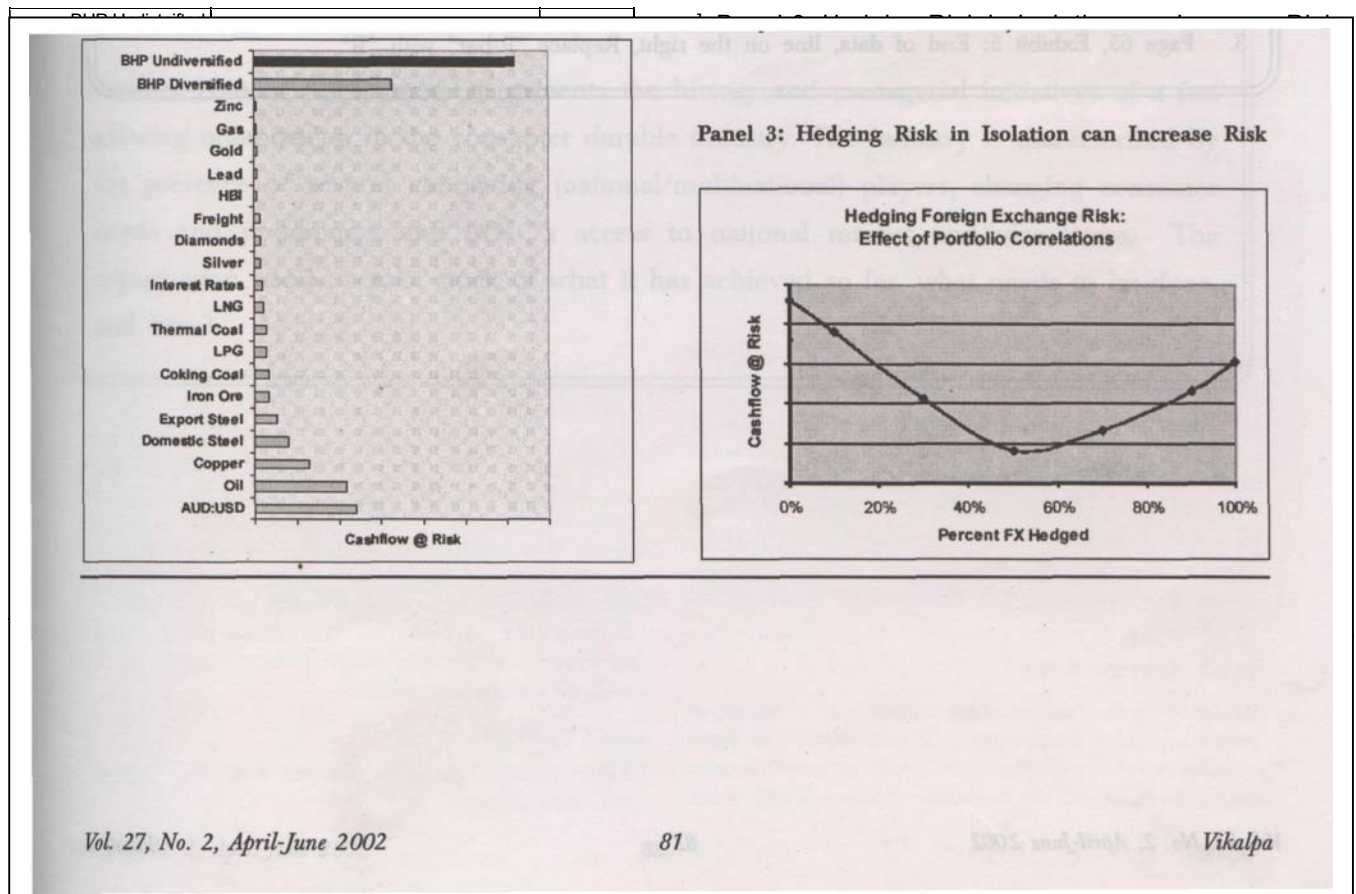
What we need to do is to take account of the diversification and calculate the overall portfolio risk. We take this model of BHP's businesses by risk factor and look at the historic correlations between these risk factors and we build a correlation matrix. We then simulate prices over a period of a year, many thousand times. In fact, in the example I am going to show you, we have simulated the next year for BHP, 5000 times. The output of the simulation is to develop a probability distribution for the portfolio. The tool also helps to calculate which are the biggest risks. Australian dollar, oil and copper, represent by far the biggest risks for BHP. The others fall away quite quickly (Panel 2).

It turns out that with the actual diversification, with zero hedges in place, BHP has a cash flow at risk of 1.6 billion dollars. The natural hedges that we have reduces by half the amount of risk in our business. The current hedging that we have in place further reduces that to 1.4 billion dollars.

One of the concepts behind this sort of analysis is that you are less interested in the individual risk-return, you are more interested in BHP portfolio risk-return. If you focus on a specific risk you may unwind the natural hedges in the portfolio. I just want to show you an example of that. This panel (Panel 3) I am going to show you has risk on the vertical axis and the percentage of foreign exchange exposure hedged on the horizontal axis. We then run a simulation where we have added increasing levels of foreign exchange cover. The impact is to reduce risk up to a certain point after which the hedging activity begins to increase risk. This is happening because by hedging your currency risk, you are unwinding some of the natural hedges.

Managing Residual Risk

So, BHP has a diversified portfolio, we have quantified the extent of the diversification. Natural hedge is half the risk that we would have ordinarily. So what do we do with the residual risk? We still have with our current hedges 1.4 billion dollars in cash flow at risk. Is that something that we should choose to bear or not? We did a lot of work in terms of desk research and questionnaires with investors and analysts about whether there was any value to taking commodity risk out of the business. We came to the conclusion that there was no value being paid for a reduction in cash flow or any volatility as a consequence of market risk by the market.



The case is based on the following materials available from the BHP (now BHP Billiton).
(Website: <http://www.bhpbUilton.com>)

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Errata

We regret the errors that have appeared in the Management Case, "Indian Food Specialities Limited," published in the January-March 2002 (Vol 27, No 1) issue of *Vikalpa*. The corrections are as follows:

1. Page 61, Chart 2: Replace "R-bar" with "R" in the Chart Tide.
2. Page 61, Exhibit 1: First line, insert "hazard?" at the end of the sentence.
3. Page 65, Exhibit 5: End of data, line on the right, Replace "R-bar" with "R"